# VOLTAGE SAG MITIGATION PROPOSALS FOR MERBOK MDF LANKA PVT LTD

Master of Science Dissertation

by
D.K.A.M. DINAMULLA

Department of Electrical Engineering
University of Moratuwa, Sri Lanka

2010

# Abstract

Power Quality has been an important concept since the inception of power systems. With more and more sensitive equipment being used in the industries, the requirement of standards of power quality has been highlighted. Power quality related problems that result in loss of production in critical processes create a dilemma for both the serving utility and the customer. This research is based on giving proposals to solve a specific power quality problem involving voltage sags in one of the large scale customers of Ceylon Electricity Board i.e. Merbok MDF Lanka (Pvt) Ltd. The customer has installed considerable amount of sensitive equipment in his large scale manufacturing processes including PLC equipments, variable speed drives, etc. The customer has faced frequent power interruptions and subsequent production losses due to the said power quality problem.

Data was obtained from the customer prermses and from the Horana GSS. After analyzing the data it was revealed that most of the Voltage sags are due to fault conditions in the nearby distribution feeders. Voltage sags having 0.8 to 0.9 p.u. magnitude and 0.5 to 3s duration are the most common.

When giving a solution for the problem both system level improvements and device level mitigation solutions are proposed. In data analysis it is found that pattern of tripping is highly weather dependent. This is considered in system improvement proposals and regular way leave clearance of identified feeders is found to be executed. In addition to that installing auto reclosers at the Horana gantry is proposed in order to reduce the fault clearance time and to improve system reliability as it will directly reduce number of unnecessary tripping at the grid substation.

As a device level mitigation several options such as static transfer switch (STS), uninterruptible power supply (UPS), shunt connected voltage source converter (STATCOM), series connected voltage source converter (SVC) cum dynamic voltage restorer (DVR) are discussed. DVR is proposed as the best solution for this situation as it r

can provide voltage support for individual loads. The power rating of the DVR and the capacity requirement of the energy source is calculated. It is expected that the outcome of the study would be much beneficial to the customer in solving the problem and it would be beneficial to other industrial consumers in solving similar problems. In addition to that, I expect it would be beneficial to Ceylon Electricity Board, i.e.my employer in managing Quality of Power.